Answers to the Review Questions in Chapter 5

1. a) Suppose that the face value of a bond that matures in one year is $100 with a coupon rate of 8%. You can buy this bond today for $95. What is the interest rate (yield to maturity) on this bond?

\[
\text{\$95} = \frac{\text{\$108}}{1+R} \quad \text{so} \quad 1+R = \frac{\text{\$108}}{\text{\$95}}
\]

or \( R = .1368 \) or 13.68%

b) What happens to the interest rate on the bond, if its price falls to $92?

\[
R = \frac{\text{\$108} - \text{\$92}}{\text{\$92}} = .1739 \text{ or } 17.39\%
\]

2) Suppose you buy a car for $5000. You borrow the entire amount on a 3 year fixed rate loan. That is, a loan that is completely repaid in 3 years and the interest rate on the loan is fixed at 8% per year. The payment schedule calls for three equal payments beginning in one year. How much is each payment.

the information given is: PVSTREAM = $5,000

stream of payments \( A_1 = A_2 = A_3 = A \) because the payments are assumed to be equal (which is the case on most car loans)
\[ R = 0.08 \]

\[
$5,000 = \frac{A}{(1.08)} + \frac{A}{(1.08)^2} + \frac{A}{(1.08)^3}
\]

\[
$5,000 = \left[ \frac{1}{(1.08)} + \frac{1}{(1.08)^2} + \frac{1}{(1.08)^3} \right]A
\]

\[
\frac{5,000}{2.57} = \frac{A}{1.945.53} = A
\]

3) To get an approximation of how much monthly payments would be this loan divide your answer to 2 by 12.

\[
\frac{1,945.53}{12} = 162.13
\]

4) The winner of the Ohio lottery receives 20 checks in equal amounts. The first check is paid at time the winner is announced. For example, if the jackpot is $20,000,000 the winner receives 20 checks, one per year, for $1 million. The first payment is made shortly after the presentation of the winning ticket. If the lottery jackpot is $10 million, and the current interest rate is .07, what is the present value of the jackpot? Is it really a $10 million jackpot?

\[
\frac{500,000 + \frac{500,000}{(1.07)} + \frac{500,000}{(1.07)^2} + \ldots + \frac{500,000}{(1.07)^{19}}}{1.07} = 5,667,797
\]

NO, its not a $10 million lottery.

5) What is the present value of $312 to be paid 10 years from now when the interest rate is 12%? Give both a numerical answer and the intuitive or conceptual meaning.

\[
\frac{312}{1.12}^{10} = \frac{312}{3.106} = 100.45
\]

the number of dollars you have to give up today to get $312 10 years from now when the interest rate is .12 or 12% is $100.45.

6) Consider the following to contracts. To keep things simple suppose the dollar amounts are paid once year.

<table>
<thead>
<tr>
<th>contract A</th>
<th>year1</th>
<th>year2</th>
<th>year3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$300,000</td>
<td>$400,000</td>
<td>$500,000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>contract B</th>
<th>year1</th>
<th>year2</th>
<th>year3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$200,000</td>
<td>$600,000</td>
<td>$400,000</td>
<td></td>
</tr>
</tbody>
</table>

If you are an agent for a pro athlete, and the interest rate was 10%, would you recommend contract A or contract B? Explain.

Calculate the present value of each contract and recommend the contract with the highest PVSTREAM.
\[
\frac{300,000}{1.1} + \frac{400,000}{1.1^2} + \frac{500,000}{1.1^3} = \$978,963.19
\]

\[
\frac{200,000}{1.1} + \frac{600,000}{1.1^2} + \frac{400,000}{1.1^3} = \$978,211.87
\]

Recommend contract A